~~09567865~~

09/973,638

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FILE 'HOME' ENTERED AT 15:55:12 ON 01 APR 2003

=> file biosis medline caplus wpids uspatfull
COST IN U.S. DOLLARS                                SINCE FILE      TOTAL
                                                       ENTRY    SESSION
FULL ESTIMATED COST                                     0.21       0.21

FILE 'BIOSIS' ENTERED AT 15:55:31 ON 01 APR 2003
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FILE 'MEDLINE' ENTERED AT 15:55:31 ON 01 APR 2003

FILE 'CAPLUS' ENTERED AT 15:55:31 ON 01 APR 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
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FILE 'USPATFULL' ENTERED AT 15:55:31 ON 01 APR 2003
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*** YOU HAVE NEW MAIL ***

=> s nanoparticle? or nanosphere? or nanostructure?
L1       46292 NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?

=> s l1 and oligonucleotide?
L2        1809 L1 AND OLIGONUCLEOTIDE?

=> s l2 and hybridization
L3         934 L2 AND HYBRIDIZATION

=> s l3 and (substrate? or solid support?)
L4         744 L3 AND (SUBSTRATE? OR SOLID SUPPORT?)

=> s l4 and kit
L5         524 L4 AND KIT

=> s l5 and (nanoparticle? or nanosphere? or nanostructure?) (5a) oligonucleotide?
L6          98 L5 AND (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?) (5A)
               OLIGONUCLEOTIDE?

=> dup rem l6
COMMAND INTERRUPTED
If this message appears repeatedly, please notify the Help Desk.
Enter "HELP STN" for information on contacting the nearest STN Help
Desk by telephone or via SEND in the STNMAIL file.

=> d his

     (FILE 'HOME' ENTERED AT 15:55:12 ON 01 APR 2003)

     FILE 'BIOSIS, MEDLINE, CAPLUS, WPIDS, USPATFULL' ENTERED AT 15:55:31 ON
     01 APR 2003
L1       46292 S NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?
L2        1809 S L1 AND OLIGONUCLEOTIDE?
L3         934 S L2 AND HYBRIDIZATION
L4         744 S L3 AND (SUBSTRATE? OR SOLID SUPPORT?)
L5         524 S L4 AND KIT
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09567863

L6 98 S L5 AND (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?) (5A)

=> dup rem l6
COMMAND INTERRUPTED
If this message appears repeatedly, please notify the Help Desk.
Enter "HELP STN" for information on contacting the nearest STN Help
Desk by telephone or via SEND in the STNMAIL file.

=> s l6 and array?
L7 71 L6 AND ARRAY?

=> s l7 and type? (4a) (nanoparticle? or nanosphere? or nanostructure?)
L8 34 L7 AND TYPE? (4A) (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTUR
E?)

=> dup rem l8
PROCESSING COMPLETED FOR L8
L9 34 DUP REM L8 (0 DUPLICATES REMOVED)

=> d l9 bib abs 1-34

L9 ANSWER 1 OF 34 USPATFULL
AN 2003:86172 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2003059777 A1 20030327
AI US 2001-957313 A1 20010920 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING
Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999,
GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US
1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of
Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S.
Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8060
AB The invention provides methods of detecting a nucleic acid. The methods
comprise contacting the nucleic acid with one or more types of particles
having oligonucleotides attached thereto. In one embodiment of the
method, the oligonucleotides are attached to nanoparticles and have
sequences complementary to portions of the sequence of the nucleic acid.
A detectable change (preferably a color change) is brought about as a
result of the hybridization of the oligonucleotides on the nanoparticles
to the nucleic acid. The invention also provides compositions and kits
comprising particles. The invention further provides methods of
synthesizing unique nanoparticle-oligonucleotide conjugates, the
conjugates produced by the methods, and methods of using the conjugates.
In addition, the invention provides nanomaterials and nanostructures
comprising nanoparticles and methods of nanofabrication utilizing
nanoparticles. Finally, the invention provides a method of separating a

selected nucleic acid from other nucleic acids.

L9 ANSWER 2 OF 34 USPATFULL
AN 2003:78438 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2003054358 A1 20030320
AI US 2001-975376 A1 20011011 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8059
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 3 OF 34 USPATFULL
AN 2003:71346 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc.
PI US 2003049631 A1 20030313
AI US 2001-974500 A1 20011010 (9)

09567863

RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 172
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 6565
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise (contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto, In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles The invention further provides nanomaterials and iianostructures comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 4 OF 34 USPATFULL
AN 2003:71345 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2003049630 A1 20030313
AI US 2001-957318 A1 20010920 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8041
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods

comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 5 OF 34 USPATFULL
AN 2003:64684 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C, Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2003044805 A1 20030306
AI US 2001-981344 A1 20011015 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8061
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

09567863

L9 ANSWER 6 OF 34 USPATFULL
AN 2003:30222 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Park, So-Jung, Evanston, IL, UNITED STATES
PI US 2003022169 A1 20030130
AI US 2001-820279 A1 20010328 (9)
RLI Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-176409P 20000113 (60)
US 2000-200161P 20000426 (60)
US 2000-192699P 20000328 (60)
US 2000-254392P 20001208 (60)
US 2000-255235P 20001211 (60)
DT Utility
FS APPLICATION
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606
CLMN Number of Claims: 570
ECL Exemplary Claim: 1
DRWN 65 Drawing Page(s)
LN.CNT 11127
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.F

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 7 OF 34 USPATFULL
AN 2003:17339 USPATFULL
TI Methods for detection and quantification of analytes in complex mixtures
IN Dimitrov, Krassen, Seattle, WA, UNITED STATES
PI US 2003013091 A1 20030116
AI US 2001-898743 A1 20010703 (9)
DT Utility
FS APPLICATION
LREP CAMPBELL & FLORES LLP, 4370 LA JOLLA VILLAGE DRIVE, 7TH FLOOR, SAN DIEGO, CA, 92122
CLMN Number of Claims: 84
ECL Exemplary Claim: 1
DRWN 1 Drawing Page(s)
LN.CNT 1751
CAS INDEXING IS AVAILABLE FOR THIS PATENT.

09567863

AB The invention provides a diverse population of uniquely labeled probes, containing about thirty or more target specific nucleic acid probes each attached to a unique label bound to a nucleic acid. Also provided is a method of producing a population of uniquely labeled nucleic acid probes. The method consists of (a) synthesizing a population of target specific nucleic acid probes each having a different specifier; (b) synthesizing a corresponding population of anti-genedigits each having a unique label, the population having a diversity sufficient to uniquely hybridize to genedigits within the specifiers, and (c) hybridizing the populations of target nucleic acid probes to the anti-genedigits, to produce a population in which each of the target specific probes is uniquely labeled. Also provided is a method of detecting a nucleic acid analyte. The method consists of (a) contacting a mixture of nucleic acid analytes under conditions sufficient for **hybridization** with a plurality of target specific nucleic acid probes each having a different specifier; (b) contacting the mixture under conditions sufficient for **hybridization** with a corresponding plurality of anti-genedigits each having a unique label, the plurality of anti-genedigits having a diversity sufficient to uniquely hybridize to genedigits within the specifiers, and (c) uniquely detecting a hybridized complex between one or more analytes in the mixture, a target specific probe, and an anti-genedigit.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 8 OF 34 USPATFULL
AN 2003:13189 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, United States
Letsinger, Robert L., Wilmette, IL, United States
Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States
Taton, Thomas A., Chicago, IL, United States
PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)
PI US 6506564 B1 20030114
AI US 2000-603830 20000626 (9)
RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997
PRAI US 2000-200161P 20000426 (60)
US 1996-31809P 19960729 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Riley, Jezia
LREP McDonnell Boehnen Hulbert & Berghoff
CLMN Number of Claims: 42
ECL Exemplary Claim: 1
DRWN 84 Drawing Figure(s); 47 Drawing Page(s)
LN.CNT 5976
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of

synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 9 OF 34 WPIDS (C) 2003 THOMSON DERWENT
AN 2002-258024 [30] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]
DNC C2002-076817
TI Detecting nucleic acid, useful for diagnosis of genetic, viral or bacterial disease, comprises hybridizing **nanoparticles** with attached **oligonucleotides** to nucleic acid and detecting change brought about by **hybridization**.
DC B04 D16
IN ELGHANIAN, R; GARIMELLA, V; LETSINGER, R L; LI, Z; MIRKIN, C A; MUCIC, R C; PARK, S; STORHOFF, J J; TATON, T A
PA (NANO-N) NANOSPHERE INC
CYC 95
PI WO 2002018643 A2 20020307 (200230)* EN 329p
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
AU 2001081248 A 20020313 (200249)
ADT WO 2002018643 A2 WO 2001-US25237 20010810; AU 2001081248 A AU 2001-81248 20010810
FDT AU 2001081248 A Based on WO 200218643
PRAI US 2001-820279 20010328; US 2000-224631P 20000811; US 2000-254392P 20001208; US 2000-255235P 20001211; US 2001-760500 20010112
AN 2002-258024 [30] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]
AB WO 200218643 A UPAB: 20030320
NOVELTY - Detecting a nucleic acid (NA) having at least 2 portions comprising:
(a) providing **nanoparticles** (NP) with attached **oligonucleotides** (OGN), where OGN has a sequence complementary to the sequence of NA;
(b) contacting NA and NP under conditions effective to allow **hybridization** of OGN with NA; and
(c) observing a detectable change brought about by **hybridization** of OGN with NA, is new.
DETAILED DESCRIPTION - Detecting (M1) a nucleic acid (NA) having at least 2 portions comprising:
(a) providing 2 **types** of **nanoparticles** (NP) with attached **oligonucleotides** (OGN), where OGN on type 1 has a sequence complementary to a first portion of the sequence of NA and OGN on type 2 has a sequence complementary to a second portion of the sequence of NA;
(b) contacting NA and NP under conditions effective to allow **hybridization** of OGN with NA; and
(c) observing a detectable change brought about by

hybridization of OGN with NA, is new.

INDEPENDENT CLAIMS are also included for the following:

(1) a **kit** for carrying out M1;

(2) an aggregate probe comprising at least 2 types of NP having OGN attached, bound to each other as a result of **hybridization** of OGN and OGN comprises sequence complementary to a portion of NA or a hydrophobic group attached to the NP free end;

(3) a core probe comprising at least 2 types of NP having OGN attached, bound to each other as a result of **hybridization** of OGN;

(4) a **substrate** having NP attached;

(5) a metallic or semiconductor NP having OGN attached, where OGN are labeled with fluorescent molecules at NP free ends;

(6) a satellite probe comprising a particle having OGN attached and probe OGN hybridized to OGN on NP;

(7) a method (M2) of nanofabrication comprising:

(a) providing a linking OGN having a selected sequence of 2 portions;

(b) providing NP having OGN attached, where OGN comprises a sequence complementary to the linking OGN; and

(c) contacting linking OGN and NP under **hybridization** conditions so that a desired nanomaterial or **nanostructure** is formed where NP are held together by OGN connectors;

(8) nanomaterials or **nanostructures** composed of NP having OGN attached, where NP are held together by OGN connectors;

(9) an assembly of containers comprising containers holding NP with OGN attached;

(10) a NP having a number of different OGN attached;

(11) separating (M3) a selected NA having 2 portions;

(12) binding (M4) OGN to charged NP to produce stable NP-OGN conjugates;

(13) NP-OGN conjugates comprising OGN attached to NP at a surface density sufficient so that the conjugates are stable, where OGN has sequence complementary to a NA or another OGN;

(14) detecting a NA using the NP-OGN conjugates;

(15) a method of nanofabrication using the NP-OGN conjugates;

(16) separating a selected NA using the NP-OGN conjugates;

(17) NP-OGN conjugates which are NP having OGN attached, where OGN have a covalently bound cyclic disulfide functional group or polythiol functional group that can bind to NP;

(18) OGN having a covalently bound cyclic disulfide functional group or polythiol functional group that can bind NP; and

(19) detecting (M5) an analyte in a sample.

USE - The methods are useful for detecting a nucleic acid, separating a selected nucleic acid from others and methods of nanofabrication (all claimed). Detecting analytes such as nucleic acids and proteins are useful for the diagnosis of genetic, bacterial and viral diseases.

ADVANTAGE - The OGN-NP conjugates that use cyclic disulfide linkers improve the sensitivity of diagnostic assays. In particular assays using OGN-NP conjugates prepared using linkers comprising a steroid residue attached to a cyclic disulfide have been found to be approx. 10 times more sensitive than assays employing conjugates prepared using alkanethiols or acyclic disulfides as the linker. The OGN-NP conjugates are stable allowing them to be used directly in PCR solutions. Therefore conjugates added as probes to a DNA target to be PCR amplified can be carried through the 30 or 40 heating cooling cycles of the PCR and are still able to detect the amplicons without opening the tubes. Opening the tubes for addition of probes after PCR can cause serious problems through contamination of the equipment to be used for subsequent tests.

Dwg.0/64

L9 ANSWER 10 OF 34 USPATFULL

AN 2002:337329 USPATFULL

09567863

TI Bio-barcodes based on **oligonucleotide**-modified **nanoparticles**
IN Mirkin, Chad A., Willmette, IL, UNITED STATES
Park, So-Jung, Evanston, IL, UNITED STATES
Nam, Jwa-Min, Evanston, IL, UNITED STATES
PI US 2002192687 A1 20021219
AI US 2002-108211 A1 20020327 (10)
RLI Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001, PENDING
PRAI WO 2001-US10071 20010328
US 2000-192699P 20000328 (60)
US 2001-350560P 20011113 (60)
DT Utility
FS APPLICATION
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606
CLMN Number of Claims: 41
ECL Exemplary Claim: 1
DRWN 4 Drawing Page(s)
LN.CNT 2185
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The present invention relates to a screening methods, compositions, and kits for detecting for the presence or absence of one or more target analytes, e.g. proteins such as antibodies, in a sample. In particular, the present invention relates to a method that utilizes reporter **oligonucleotides** as biochemical barcodes for detecting multiple protein structures or other target analytes in one solution.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 11 OF 34 USPATFULL
AN 2002:322449 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002182613 A1 20021205
AI US 2001-976971 A1 20011012 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 172
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 6563
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of

the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 12 OF 34 USPATFULL
AN 2002:322447 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002182611 A1 20021205
AI US 2001-966491 A1 20010928 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606
CLMN Number of Claims: 190
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 6646
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 13 OF 34 USPATFULL
AN 2002:307830 USPATFULL

09567863

TI Movement of biomolecule-coated nanoparticles in an electric field
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Chicago, IL, UNITED STATES
Taton, Thomas Andrew, Chicago, IL, UNITED STATES
Garimella, Viswanadham, Evanston, IL, UNITED STATES
Li, Zhi, Evanston, IL, UNITED STATES
Park, So-Jung, Evanston, IL, UNITED STATES
PI US 2002172953 A1 20021121
AI US 2001-927777 A1 20010810 (9)
RLI Continuation-in-part of Ser. No. US 2001-820279, filed on 28 Mar 2001, PENDING Continuation-in-part of Ser. No. US 2001-760500, filed on 12 Jan 2001, PENDING Continuation-in-part of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-176409P 20000113 (60)
US 2000-200161P 20000426 (60)
US 2000-192699P 20000328 (60)
US 2000-254392P 20001208 (60)
US 2000-255235P 20001211 (60)
US 2000-224631P 20000811 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 598
ECL Exemplary Claim: 1
DRWN 64 Drawing Page(s)
LN.CNT 11435
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 14 OF 34 USPATFULL
AN 2002:294562 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Chicago, IL, UNITED STATES

09567863

Taton, Thomas A., Chicago, IL, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002164605 A1 20021107
AI US 2001-966312 A1 20010928 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8066
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 15 OF 34 USPATFULL
AN 2002:287518 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002160381 A1 20021031
AI US 2001-975498 A1 20011011 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, PENDING Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606

09567863

CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 5695
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique **nanoparticle-oligonucleotide** conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 16 OF 34 USPATFULL
AN 2002:280028 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002155462 A1 20021024
AI US 2001-976577 A1 20011012 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8047
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of

synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 17 OF 34 USPATFULL
AN 2002:280027 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas Andrew, Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002155461 A1 20021024
AI US 2001-976378 A1 20011012 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8052
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 18 OF 34 USPATFULL
AN 2002:280025 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES

09567863

Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002155459 A1 20021024
AI US 2001-975062 A1 20011011 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8059
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 19 OF 34 USPATFULL
AN 2002:280024 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002155458 A1 20021024
AI US 2001-967409 A1 20010928 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606

09567863

CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8059
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 20 OF 34 USPATFULL
AN 2002:280008 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Chicago, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
Garimella, Viswanadham, Evanston, IL, UNITED STATES
Li, Zhi, Evanston, IL, UNITED STATES
PI US 2002155442 A1 20021024
AI US 2001-760500 A1 20010112 (9)
RLI Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
US 2000-176409P 20000113 (60)
US 2000-213906P 20000626 (60)
DT Utility
FS APPLICATION
LREP MCDONNELL BOEHNEN HULBERT & BERGHOFF, 300 SOUTH WACKER DRIVE, SUITE 3200, CHICAGO, IL, 60606
CLMN Number of Claims: 485
ECL Exemplary Claim: 1
DRWN 51 Drawing Page(s)
LN.CNT 8754
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of

synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 21 OF 34 USPATFULL
AN 2002:272801 USPATFULL
TI Compositions and methods for the therapy and diagnosis of colon cancer
IN Stolk, John A., Bothell, WA, UNITED STATES
Xu, Jiangchun, Bellevue, WA, UNITED STATES
Chenault, Ruth A., Seattle, WA, UNITED STATES
Meagher, Madeleine Joy, Seattle, WA, UNITED STATES
PA Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)
PI US 2002150922 A1 20021017
AI US 2001-998598 A1 20011116 (9)
PRAI US 2001-304037P 20010710 (60)
US 2001-279670P 20010328 (60)
US 2001-267011P 20010206 (60)
US 2000-252222P 20001120 (60)
DT Utility
FS APPLICATION
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300, SEATTLE, WA, 98104-7092
CLMN Number of Claims: 17
ECL Exemplary Claim: 1
DRWN No Drawings
LN.CNT 9233
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB Compositions and methods for the therapy and diagnosis of cancer, particularly colon cancer, are disclosed. Illustrative compositions comprise one or more colon tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly colon cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 22 OF 34 USPATFULL
AN 2002:265844 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002146720 A1 20021010
AI US 2001-961949 A1 20010920 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)

09567863

DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8063
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 23 OF 34 USPATFULL
AN 2002:251128 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002137072 A1 20020926
AI US 2001-976617 A1 20011012 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8061
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles

to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 24 OF 34 USPATFULL
AN 2002:251127 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002137071 A1 20020926
AI US 2001-974007 A1 20011010 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8063
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 25 OF 34 USPATFULL
AN 2002:251126 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES

09567863

Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002137070 A1 20020926
AI US 2001-973638 A1 20011010 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8060
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 26 OF 34 USPATFULL
AN 2002:251114 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Chicago, IL, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002137058 A1 20020926
AI US 2001-923625 A1 20010807 (9)
RLI Continuation of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 105

09567863

ECL Exemplary Claim: 1
DRWN 26 Drawing Page(s)
LN.CNT 3903
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 27 OF 34 USPATFULL
AN 2002:243051 USPATFULL
TI Compositions and methods for the therapy and diagnosis of ovarian cancer
IN Algate, Paul A., Issaquah, WA, UNITED STATES
Jones, Robert, Seattle, WA, UNITED STATES
Harlocker, Susan L., Seattle, WA, UNITED STATES
PA Corixa Corporation, Seattle, WA, UNITED STATES, 98104 (U.S. corporation)
PI US 2002132237 A1 20020919
AI US 2001-867701 A1 20010529 (9)
PRAI US 2000-207484P 20000526 (60)
DT Utility
FS APPLICATION
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300, SEATTLE, WA, 98104-7092
CLMN Number of Claims: 11
ECL Exemplary Claim: 1
DRWN No Drawings
LN.CNT 25718
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB Compositions and methods for the therapy and diagnosis of cancer, particularly ovarian cancer, are disclosed. Illustrative compositions comprise one or more ovarian tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly ovarian cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 28 OF 34 USPATFULL
AN 2002:242791 USPATFULL
TI Compositions and methods for the therapy and diagnosis of colon cancer
IN King, Gordon E., Shoreline, WA, UNITED STATES
Meagher, Madeleine Joy, Seattle, WA, UNITED STATES
Xu, Jiangchun, Bellevue, WA, UNITED STATES
Secrist, Heather, Seattle, WA, UNITED STATES
PA Corixa Corporation, Seattle, WA, UNITED STATES (U.S. corporation)
PI US 2002131971 A1 20020919
AI US 2001-33528 A1 20011226 (10)
RLI Continuation-in-part of Ser. No. US 2001-920300, filed on 31 Jul 2001,

09567863

PENDING
PRAI US 2001-302051P 20010629 (60)
US 2001-279763P 20010328 (60)
US 2000-223283P 20000803 (60)
DT Utility
FS APPLICATION
LREP SEED INTELLECTUAL PROPERTY LAW GROUP PLLC, 701 FIFTH AVE, SUITE 6300, SEATTLE, WA, 98104-7092
CLMN Number of Claims: 17
ECL Exemplary Claim: 1
DRWN No Drawings
LN.CNT 8083
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB Compositions and methods for the therapy and diagnosis of cancer, particularly colon cancer, are disclosed. Illustrative compositions comprise one or more colon tumor polypeptides, immunogenic portions thereof, polynucleotides that encode such polypeptides, antigen presenting cell that expresses such polypeptides, and T cells that are specific for cells expressing such polypeptides. The disclosed compositions are useful, for example, in the diagnosis, prevention and/or treatment of diseases, particularly colon cancer.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 29 OF 34 USPATFULL
AN 2002:235385 USPATFULL
TI Nanoparticles having oligonucleotides attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, UNITED STATES
Letsinger, Robert L., Wilmette, IL, UNITED STATES
Mucic, Robert C., Glendale, CA, UNITED STATES
Storhoff, James J., Evanston, IL, UNITED STATES
Elghanian, Robert, Skokie, IL, UNITED STATES
Taton, Thomas A., Little Canada, MN, UNITED STATES
PA Nanosphere, Inc. (U.S. corporation)
PI US 2002127574 A1 20020912
AI US 2001-973788 A1 20011010 (9)
RLI Continuation of Ser. No. US 2000-603830, filed on 26 Jun 2000, PENDING Continuation-in-part of Ser. No. US 1999-344667, filed on 25 Jun 1999, GRANTED, Pat. No. US 6361944 Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, ABANDONED Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997, UNKNOWN
PRAI US 1996-31809P 19960729 (60)
US 2000-200161P 20000426 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 431
ECL Exemplary Claim: 1
DRWN 46 Drawing Page(s)
LN.CNT 8060
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having oligonucleotides attached thereto. In one embodiment of the method, the oligonucleotides are attached to nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the hybridization of the oligonucleotides on the nanoparticles to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides methods of synthesizing unique nanoparticle-oligonucleotide conjugates, the

conjugates produced by the methods, and methods of using the conjugates. In addition, the invention provides nanomaterials and nanostructures comprising nanoparticles and methods of nanofabrication utilizing nanoparticles. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 30 OF 34 USPATFULL
AN 2002:60922 USPATFULL
TI Method of detection by enhancement of silver staining
IN Letsinger, Robert L., Wilmette, IL, UNITED STATES
Garimella, Viswanadham, Evanston, IL, UNITED STATES
PI US 2002034756 A1 20020321
AI US 2001-903461 A1 20010711 (9)
PRAI US 2000-217782P 20000711 (60)
DT Utility
FS APPLICATION
LREP Emily Miao, McDonnell Boehnen Hulbert & Berghoff, 32nd Floor, 300 S. Wacker Drive, Chicago, IL, 60606
CLMN Number of Claims: 30
ECL Exemplary Claim: 1
DRWN 5 Drawing Page(s)
LN.CNT 558
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The present invention relates to a method for amplifying a detection signal by enhancing or promoting the deposition of additional silver in assay detection systems where the formation of a silver spot serves as a reporter for the presence of a target molecule, including biological polymers (e.g., proteins and nucleic acids) and small molecules.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 31 OF 34 USPATFULL
AN 2002:332594 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, United States
Letsinger, Robert L., Wilmette, IL, United States
Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States
PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)
PI US 6495324 B1 20021217
AI US 2000-693005 20001020 (9)
RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997
PRAI US 1996-31809P 19960729 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Riley, Jezia
LREP McDonnell Boehnen Hulbert & Berghoff
CLMN Number of Claims: 21
ECL Exemplary Claim: 1
DRWN 62 Drawing Figure(s); 34 Drawing Page(s)
LN.CNT 4289
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to

nanoparticles and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 32 OF 34 USPATFULL
AN 2002:168347 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, United States
Letsinger, Robert L., Wilmette, IL, United States
Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States
PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)
PI US 6417340 B1 20020709
AI US 2000-693352 20001020 (9)
RLI Division of Ser. No. US 1999-344667, filed on 25 Jun 1999
Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999, now abandoned Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997
PRAI US 1996-31809P 19960729 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Riley, Jezia
LREP McDonnell Boehnen Hulbert & Berghoff
CLMN Number of Claims: 10
ECL Exemplary Claim: 1
DRWN 58 Drawing Figure(s); 34 Drawing Page(s)
LN.CNT 4214
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 33 OF 34 USPATFULL
AN 2002:63683 USPATFULL
TI **Nanoparticles** having **oligonucleotides** attached thereto and uses therefor
IN Mirkin, Chad A., Wilmette, IL, United States
Letsinger, Robert L., Wilmette, IL, United States

09567863

Mucic, Robert C., Glendale, CA, United States
Storhoff, James J., Evanston, IL, United States
Elghanian, Robert, Chicago, IL, United States
PA Nanosphere, Inc., Northbrook, IL, United States (U.S. corporation)
PI US 6361944 B1 20020326
AI US 1999-344667 19990625 (9)
RLI Continuation-in-part of Ser. No. US 1999-240755, filed on 29 Jan 1999
Continuation-in-part of Ser. No. WO 1997-US12783, filed on 21 Jul 1997
PRAI US 1996-31809P 19960729 (60)
DT Utility
FS GRANTED
EXNAM Primary Examiner: Riley, Jezia
LREP McDonnell Boehnen Hulbert & Berghoff
CLMN Number of Claims: 12
ECL Exemplary Claim: 1
DRWN 58 Drawing Figure(s); 34 Drawing Page(s)
LN.CNT 4158
CAS INDEXING IS AVAILABLE FOR THIS PATENT.
AB The invention provides methods of detecting a nucleic acid. The methods comprise contacting the nucleic acid with one or more types of particles having **oligonucleotides** attached thereto. In one embodiment of the method, the **oligonucleotides** are attached to **nanoparticles** and have sequences complementary to portions of the sequence of the nucleic acid. A detectable change (preferably a color change) is brought about as a result of the **hybridization** of the **oligonucleotides** on the **nanoparticles** to the nucleic acid. The invention also provides compositions and kits comprising particles. The invention further provides nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication utilizing the **nanoparticles**. Finally, the invention provides a method of separating a selected nucleic acid from other nucleic acids.

CAS INDEXING IS AVAILABLE FOR THIS PATENT.

L9 ANSWER 34 OF 34 WPIDS (C) 2003 THOMSON DERWENT
AN 2001-451868 [48] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]
DNC C2001-136537
TI Detecting a nucleic acid useful in e.g. diagnosing genetic, bacterial or viral diseases, by contacting the nucleic acid with **oligonucleotides** attached to **nanoparticles** and having sequences complementary a portion of the nucleic acid.
DC B04 D16
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J; TATON, T A; GARIMELLA, V; LI, Z
PA (NANO-N) NANOSPHERE INC; (ELGH-I) ELGHANIAN R; (GARI-I) GARIMELLA V; (LETS-I) LETSINGER R L; (LIZZ-I) LI Z; (MIRK-I) MIRKIN C A; (MUCI-I) MUCIC R C; (STOR-I) STORHOFF J J; (TATO-I) TATON T A
CYC 94
PI WO 2001051665 A2 20010719 (200148)* EN 229p
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
AU 2001032795 A 20010724 (200166)
US 2002127574 A1 20020912 (200262)
US 2002155442 A1 20021024 (200277)

US 6506564 B1 20030114 (200313)

ADT WO 2001051665 A2 WO 2001-US1190 20010112; AU 2001032795 A AU 2001-32795 20010112; US 2002127574 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-973788 20011010; US 2002155442 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US 2000-200161P 20000426, Provisional US 2000-213906P 20000626, US 2001-760500 20010112; US 6506564 B1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, US 2000-603830 20000626

FDT AU 2001032795 A Based on WO 200151665; US 2002127574 A1 CIP of US 6361944; US 2002155442 A1 CIP of US 6361944

PRAI US 2001-760500 20010112; US 2000-176409P 20000113; US 2000-200161P 20000426; US 2000-603830 20000626; US 1996-31809P 19960729; WO 1997-US12783 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US 2001-973788 20011010; US 2000-213906P 20000626

AN 2001-451868 [48] WPIDS

CR 1998-145263 [13]; 2001-061976 [07]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]

AB WO 200151665 A UPAB: 20030320

NOVELTY - Detecting a nucleic acid having at least 2 portions, comprises contacting the nucleic acid with one or more **types** of **nanoparticles** having **oligonucleotides** attached to the **nanoparticles** and having sequences complementary to portions of the sequence of the nucleic acid.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) methods of detecting a nucleic acid having at least 2 portions comprising:

(a) contacting the nucleic acid with one or more **types** of **nanoparticles** having **oligonucleotides** attached to the **nanoparticles** and having sequences complementary to portions of the sequence of the nucleic acid, under conditions allowing the **hybridization** of the **oligonucleotides** on the **nanoparticles** with the nucleic acid; and

(b) observing a detectable change brought about by **hybridization** of the **oligonucleotides** on the **nanoparticles** with the nucleic acid;

(2) kits comprising at least one container holding a composition containing at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it, where the first type has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second **type** of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid;

(3) an aggregate probe comprising at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it, the **nanoparticles** of the aggregate probe are bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached to them, and at least one of the **nanoparticles** of the aggregate probe having **oligonucleotides** attached to it which have a hydrophobic group on the end not attached to the **nanoparticles**;

(4) a **kit** comprising a container holding a core probe having at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it and the **nanoparticles** of the core probe is bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached

to them;
(5) a core probe comprising at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it;
(6) a **substrate** having **nanoparticles** attached to it;
(7) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it which are labeled with fluorescent molecule at the end not attached to the **nanoparticle**;
(8) a satellite probe comprising a particle having attached **oligonucleotides**, and probe **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**;
(9) methods of nanofabrication;
(10) nanomaterials or **nanostructures** composed of **nanoparticles** having **oligonucleotides** attached to it and being held by **oligonucleotide** connectors;
(11) a composition comprising at least 2 **types** of **nanoparticles** having **oligonucleotides** attached to it;
(12) an assembly of containers holding **nanoparticles** having **oligonucleotides** attached to them;
(13) a **nanoparticle** having multiple **oligonucleotides** attached to it;
(14) a method of separating a selected nucleic acid having at least 2 portions from other nucleic acid;
(15) methods of binding **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;
(16) **nanoparticle-oligonucleotide** conjugates which are **nanoparticles** having **oligonucleotides** attached to them, where the **oligonucleotides** are present on the surface of the **nanoparticles** at a surface density sufficient so that the conjugates are stable, and at least some of the **oligonucleotides** have sequences complementary to at least one portion of the nucleic acid or **oligonucleotide** sequence;
(17) **nanoparticles** having **oligonucleotides** attached to them which comprises at least one type of recognition **oligonucleotides** having a sequence complementary to a portion of the nucleic acid sequence, and a type of diluent **oligonucleotides**; and
(18) methods of detecting a nucleic acid.

USE - The methods are useful for detecting nucleic acids, natural or synthetic, and modified or unmodified. The methods may also be applied in the diagnosis of genetic, bacterial and viral diseases, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, and for monitoring gene therapy. The methods are further useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, for quick identification of an infection to assist in drug prescription, and in homes and health centers for inexpensive first-line screening.

ADVANTAGE - The methods, which are based on observing color change with the naked eye, are cheap, fast, simple, robust (reagents are stable), do not require specialized or expensive equipment, and little or no instrumentation is required.

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=> d his

     (FILE 'HOME' ENTERED AT 15:55:12 ON 01 APR 2003)

     FILE 'BIOSIS, MEDLINE, CAPLUS, WPIDS, USPATFULL' ENTERED AT 15:55:31 ON
     01 APR 2003
L1         46292 S NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?
L2          1809 S L1 AND OLIGONUCLEOTIDE?
L3           934 S L2 AND HYBRIDIZATION
L4           744 S L3 AND (SUBSTRATE? OR SOLID SUPPORT?)
L5           524 S L4 AND KIT
L6            98 S L5 AND (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTURE?) (5A)
L7            71 S L6 AND ARRAY?
L8            34 S L7 AND TYPE? (4A) (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUC
L9            34 DUP REM L8 (0 DUPLICATES REMOVED)

=> s l6 not l9
L10           64 L6 NOT L9

=> dup rem l10
PROCESSING COMPLETED FOR L10
L11           64 DUP REM L10 (0 DUPLICATES REMOVED)

=> s l11 and probe?
L12           64 L11 AND PROBE?

=> s l12 and type? (4a) (nanoparticle? or nanosphere? or nanostructure?)
L13            4 L12 AND TYPE? (4A) (NANOPARTICLE? OR NANOSPHERE? OR NANOSTRUCTUR
                 E?)

=> d l13 bib abs 1-4

L13  ANSWER 1 OF 4  WPIDS (C) 2003 THOMSON DERWENT
AN   2003-198491 [19]    WPIDS
CR   1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];
     2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];
     2003-182627 [18]
DNC  C2003-050804
TI   Detecting nucleic acids having at least 2 portions comprises use of
     nanoparticles which have oligonucleotides attached to
     them that are complementary to portions of the nucleic acid sequence.
DC   B04 D16
IN   ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;
     TATON, T A
PA   (NANO-N) NANOSPHERE INC
CYC  1
PI   US 2002155462 A1 20021024 (200319)*      130p
ADT  US 2002155462 A1 Provisional US 1996-31809P 19960729, CIP of WO
     1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US
     1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US
     2000-603830 20000626, US 2001-976577 20011012
FDT  US 2002155462 A1 CIP of US 6361944
PRAI US 2001-976577   20011012; US 1996-31809P   19960729; WO 1997-US12783
     19970721; US 1999-240755   19990129; US 1999-344667   19990625; US
     2000-200161P  20000426; US 2000-603830   20000626
AN   2003-198491 [19]    WPIDS
CR   1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75];
     2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17];
     2003-182627 [18]
AB   US2002155462 A UPAB: 20030320
     NOVELTY - Detecting nucleic acid (NA) having at least 2 portions comprises
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providing **type** of **nanoparticles** (NP) having attached to **oligonucleotides** (O) ((O) on each NP has a sequence complementary to sequence of at least 2 portions of NA), contacting NA and NP to allow **hybridization** of (O) on NP with 2 or more portions of NA, and observing a detectable change brought about by **hybridization** of (O) on NP with NA.

DETAILED DESCRIPTION - Detecting (M1) nucleic acid (NA) having at least 2 portions by providing a type of NP (I) having **oligonucleotide** (O) attached to it ((O) on each **nanoparticle** has a sequence complementary to sequence of at least 2 portions of NA), contacting NA and NP to allow **hybridization** of (O) on NP with 2 or more portions of NA, and observing a detectable change brought about by **hybridization** of the **oligonucleotides** on the NP with the NA.

INDEPENDENT CLAIMS are included for the following:

(1) an aggregate **probe** comprising at least 2 types of NP having attached to it, where NP are bound to each other as a result of **hybridization** of some of (O) attached to it, which have:

(a) the sequence complementary to a portion of a NA; or

(b) a hydrophobic group attached to the end not attached to the NP;

(2) a core **probe** comprising at least 2 types of NP having (O) attached to it, the NP of the core **probe** being bound to each other as a result of the **hybridization** of some of the (O) attached to them;

(3) a **substrate** having NP attached to it;

(4) a metallic or semiconductor NP having (O) attached to it, where (O) is labeled with fluorescent molecules at the ends not attached to NP;

(5) kits and compositions comprising the NP;

(6) nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication using utilizing **nanoparticles**;

(7) a satellite **probe** comprising , a particle having attached **oligonucleotides**, the **oligonucleotides** having a first portion and a second portion, both portions having sequences complementary to portions of the sequence of a nucleic acid, and **probe oligonucleotide** hybridized to the **oligonucleotides** attached to the **nanoparticles**, the **probe oligonucleotides** having a first portion and a second portion, the first portion having a sequence complementary to the sequence of the first portion of the **oligonucleotides** attached to the particles, both portions having sequences complementary to portions of the sequence of the nucleic acid, the **probe oligonucleotides** further having a reporter molecule attached to one end;

(8) an assembly of containers comprising first and second containers having attached (O), and (O) attached to NP having a sequence complementary to (O) attached to NP, in the containers;

(9) a NP (I) having several different attached (O);

(10) separating a selected NA having at least 2 portions from other NAs using 2 or more types of NPs having attached (O);

(11) methods of synthesizing unique NP-(O) conjugates;

(12) NP-(O) conjugate produced by the methods;

(13) methods of using the conjugates for detecting NA having at least 2 portions;

(14) NP having **oligonucleotides** attached to them, the **oligonucleotides** comprising at least one type of recognition **oligonucleotides**, each of the recognition **oligonucleotides** comprising a spacer portion and a recognition portion, the spacer portion being designed so that it is bound to the NP, the recognition portion having a sequence complementary to at least on portion of the sequence of a nucleic acid or another **oligonucleotide**;

(15) NP having **oligonucleotides** attached to them, the

oligonucleotides comprising:

(a) at least one type of recognition **oligonucleotides**, each of the types or recognition **oligonucleotides** comprising a sequence complementary to at least one portion of the sequence of a nucleic acid or another **oligonucleotide**; and

(b) a type of diluent **oligonucleotides**; and

(16) a **kit** comprising a container holding NP-(O) conjugates and NP as described above.

USE - (I) is useful for separating a selected nucleic acid having at least 2 portions, from other nucleic acids, and for detecting nucleic acids having at least 2 portions. The MP-(O) conjugates are useful for detecting NA having at least 2 portions. (M1) is useful for detecting nucleic acid having at least 2 portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, for monitoring gene therapy, etc. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens, etc.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and do not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows schematic diagram illustrating formation of **nanoparticle** aggregates by combining **nanoparticles** having complementary **oligonucleotides** attached to them, the **nanoparticles** being held together in aggregates has result of the **hybridization** of the complementary **oligonucleotides**.

Dwg.1/41

L13 ANSWER 2 OF 4 WPIDS (C) 2003 THOMSON DERWENT
AN 2003-182627 [18] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-198491 [19]
DNC C2003-048104
TI Detecting nucleic acids having at least two portions involves use of **nanoparticles** which have **oligonucleotides** attached to them that are complementary to portions of the nucleic acid sequence.
DC B04 D16
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J; TATON, T A
PA (NANO-N) NANOSPHERE INC
CYC 1
PI US 2002155458 A1 20021024 (200318)* 130p
ADT US 2002155458 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-967409 20010928
FDT US 2002155458 A1 CIP of US 6361944
PRAI US 2001-967409 20010928; US 1996-31809P 19960729; WO 1997-US12783 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US 2000-200161P 20000426; US 2000-603830 20000626
AN 2003-182627 [18] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-174167 [17]; 2003-198491 [19]
AB US2002155458 A UPAB: 20030320

NOVELTY - Detecting (M1) nucleic acid (NA) having at least two portions involves providing **type** of **nanoparticles** (NP) attached to **oligonucleotides** (O), where (O) on each NP has a sequence complementary to sequence of at least two portions of NA, contacting NA and NP to allow **hybridization** of (O) on NP with two or more portions of NA, and observing a detectable change brought about by **hybridization** of (O) on NP with NA.

DETAILED DESCRIPTION - Detecting (M1) NA having at least two portions can optionally be carried out any of the following methods:

(a) contacting the NA with at least two types of NP having (O) attached to it, (O) on the first type of NP having a sequence complementary to a first portion of the sequence of the NA, the (O) on the second type of NP having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow **hybridization** of the (O) on the NP with the NA, and observing a detectable change brought about by **hybridization** of (O) on NP with the NA;

(b) providing a **substrate** having a first type of NP attached to it, the NP having attached to (O), the (O) having a sequence complementary to a first portion of the sequence of a NA to be detected, contacting the NA with the NP attached to the **substrate** under conditions effective to allow **hybridization** of the (O) on the NP with the NA, providing a second type of NP having attached **oligonucleotides**, (O) having a sequence complementary to one or more other portions of the sequence of the NA, contacting the NA bound to the **substrate** with the second type of NP to allow **hybridization** of the (O) on the second type of NP with the NA and observing a detectable change. Optionally, before carrying the detecting step, the method involves providing a binding **oligonucleotide** having a selected sequence having at least two portions, the first portion being complementary to at least a portion of the sequence of the (O) on the second type of NP, contacting the binding **oligonucleotide** with the second type of NP bound to the **substrate** to allow **hybridization** of the binding **oligonucleotide** to the (O) on the NP, providing a third type of NP having attached (O), the (O) having a sequence complementary to the sequence of a second portion of the binding **oligonucleotide**, contacting the third **type** of **nanoparticle** with the binding **oligonucleotide** bound tot he **substrate** to allow **hybridization** of the NP; and

(c) contacting a NA to be detected with a **substrate** having (O) attached to it, the (O) having a sequence complementary to a first portion of the sequence of the NA, the contacting taking place to allow **hybridization** of the (O) on the **substrate** with the NA, contacting the NA bound to the **substrate** with a first type of NP having one or more types of (O) attached to it, at least one of the types of **oligonucleotides** having a sequence complementary to a second portion of the sequence of the NA, the contacting taking place to allow **hybridization** of the (O) on the NP with the NA, contacting the first type of NP bound to the **substrate** with a second type of NP having (O) attached to it, the (O) on the second type of NP having a sequence complementary to at least a portion of the sequence of one of the type of (O) on the first type of NP, the contacting taking place to allow **hybridization** of the (O) on the first and second types of NP, and observing a detectable change.

INDEPENDENT CLAIMS are included for the following:

(1) an aggregate **probe** comprising at least two types of NP having attached to it, where NP are bound to each other as a result of **hybridization** of some of (O) attached to it, which have the sequence complementary to a portion of a NA or a hydrophobic group attached to the end not attached to the NP;

(2) a core **probe** comprising at least two types of NP having (O) attached to it, the NP of the core **probe** being bound to each

other as a result of the **hybridization** of some of the (O) attached to them;

(3) a **substrate** having NP attached to it;

(4) a metallic or semiconductor NP having (O) attached to it, where (O) is labeled with fluorescent molecules at the ends not attached to NP;

(5) kits and compositions comprising the NP;

(6) nanomaterials and **nanostructures** comprising **nanoparticles** and methods of nanofabrication using utilizing **nanoparticles**;

(7) a satellite **probe** comprising a particle having attached **oligonucleotides**;

(8) an assembly of containers comprising first and second containers having attached (O), and (O) attached to NP having a sequence complementary to (O) attached to NP, in the containers;

(9) a NP (I) having several different attached (O);

(10) separating a selected NA having at least two portions from other NAs using two or more types of NPs having attached (O);

(11) methods of synthesizing unique NP-(O) conjugates; NP-(O) conjugate produced by the methods;

(12) methods of using the conjugates for detecting NA having at least two portions;

(13) NP having **oligonucleotides** attached to them;

(14) a **kit** comprising a container holding NP-(O) conjugates and NP as described above.

USE - (I) is useful for separating a selected nucleic acid having at least two portions, from other nucleic acids, and for detecting nucleic acids having at least two portions. The NP-(O) conjugates are useful for detecting NA having at least two portions. (M1) is useful for detecting nucleic acid having at least two portions (claimed). (M1) is useful for detecting any type of nucleic acids which may be used for diagnosis of disease and in sequencing of nucleic acids. Preferably, the method is useful for detecting nucleic acids for diagnosis and/or monitoring of viral diseases (human immunodeficiency virus, hepatitis virus, herpes virus, cytomegalovirus and Epstein-Barr virus), bacterial diseases, sexually transmitted diseases, inherited disorders, in forensics, in DNA sequencing, for paternity testing, for cell line authentication, and for monitoring gene therapy. The method is useful in research and analytical laboratories in DNA sequencing, in the field to detect the presence of specific pathogens.

ADVANTAGE - Detecting nucleic acids based on observing a color change with the naked eye is cheap, fast, simple and robust, and does not require specialized expensive equipment.

DESCRIPTION OF DRAWING(S) - The figure shows schematic diagram illustrating formation of **nanoparticle** aggregates by combining **nanoparticles** having complementary **oligonucleotides** attached to them, the **nanoparticles** being held together in aggregates has result of the **hybridization** of the complementary **oligonucleotides**.

Dwg.1/41

L13 ANSWER 3 OF 4 WPIDS (C) 2003 THOMSON DERWENT
AN 2003-174167 [17] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-182627 [18]; 2003-198491 [19]
DNC C2003-045481
TI Detecting nucleic acid having two portions, by providing **nanoparticles** having **oligonucleotides** attached to it, contacting nucleic acid and **nanoparticles** to allow **hybridization**, and observing detectable change.
DC B04 D16
IN ELGHANIAN, R; LETSINGER, R L; MIRKIN, C A; MUCIC, R C; STORHOFF, J J;

09567863

TATON, T A
PA (NANO-N) NANOSPHERE INC
CYC 1
PI US 2002146720 A1 20021010 (200317)* 132p
ADT US 2002146720 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-200161P 20000426, Cont of US 2000-603830 20000626, US 2001-961949 20010920
FDT US 2002146720 A1 CIP of US 6361944
PRAI US 2001-961949 20010920; US 1996-31809P 19960729; WO 1997-US12783 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US 2000-200161P 20000426; US 2000-603830 20000626
AN 2003-174167 [17] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2002-608256 [65]; 2003-092900 [08]; 2003-182627 [18]; 2003-198491 [19]
AB US2002146720 A UPAB: 20030320
NOVELTY - Detecting (M1) nucleic acid having two portions, comprising providing **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to sequence of two portions of nucleic acid, contacting nucleic acid and **nanoparticles**, to allow **hybridization** of **oligonucleotides** with portions of nucleic acid, and observing a detectable change brought about by **hybridization**, is new.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) an aggregate **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** of the aggregate **probe** is bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached to them, and has **oligonucleotides** having attached to it which have a sequence complementary to a portion of the sequence of a nucleic acid;

(2) a core **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** is bound to each other as a result of **hybridization** of some of the **oligonucleotides** attached to it;

(3) a **kit** comprising a container holding a composition comprising two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **oligonucleotides** on the first **type** of **nanoparticles** has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second **type** of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid, and also comprising the core **probe**;

(4) a **substrate** having **nanoparticles** attached to it;

(5) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it, where the **oligonucleotides** are labeled with fluorescent molecules at the ends not attached to the **nanoparticle**;

(6) a satellite **probe** comprising a particle having **oligonucleotides** attached to it, and **probe** **oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of **oligonucleotides** attached to the particles, and both portions has sequences complementary to portions of the sequence of the nucleic acid, and the **probe**

oligonucleotide further has a reporter molecule attached to one end;

(7) a composition comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it;

(8) an assembly of containers comprising a first and second containers holding **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to that of the **oligonucleotides** attached to the **nanoparticles** in the containers;

(9) a **nanoparticle** (I) having several different **oligonucleotides** attached to it which comprises recognition **oligonucleotides**, each comprising a spacer portion designed so that it is bound to the **nanoparticle**, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another **oligonucleotide**, and optionally a type of diluent **oligonucleotides**;

(10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which is present on the surface of the **nanoparticles** at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**, and a covalently bound cyclic disulfide or polythiol functional group;

(12) **oligonucleotides** having a covalently bound cyclic disulfide or polythiol functional group that can bind to the **nanoparticles**;

(13) a **nanoparticle** conjugate for detecting an analyte, comprising **nanoparticles** having **oligonucleotides** bound to it, and **oligonucleotide** having bound to it a specific binding complement of an analyte having a sequence that is complementary to a portion of the **oligonucleotides** bound to the **nanoparticles** and are bound, as a result of **hybridization**, and a linker **oligonucleotide** having two portions;

(14) nonmaterials (III) or **nanostructures** composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors;

(15) a **kit** for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change; and

(16) a nanomaterial produced, by providing linking **oligonucleotide** comprising two portions, two **types** of **nanoparticles** having **oligonucleotides** attached to it, and a complex comprised of streptavidin or avidin bound to two or more biotin molecules, each having an **oligonucleotide** bound to the biotin molecule, which has a sequence that is complementary to the second portion of the linking **oligonucleotide**, and contacting the first and second **types** of **nanoparticles**, the linking **oligonucleotides** and the complex, to allow **hybridization** of the **oligonucleotides** on the **nanoparticles** to each other and to the linking **oligonucleotide** and the **hybridization** of the **oligonucleotide** of the complexes to the linking **oligonucleotides** so that a desired nanomaterials or **nanostructures** is formed.

USE - M1, (I), (II) and the aggregate **probe** are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for

detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for fabrication, and for separating a selected nucleic acid having two portions from other nucleic acids. (I), (II) and the aggregate **probe** are useful for detecting an analyte (especially polyvalent analyte) in a sample. (All claimed.)

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

Dwg.0/41

L13 ANSWER 4 OF 4 WPIDS (C) 2003 THOMSON DERWENT
AN 2002-608256 [65] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]
DNC C2002-171859
TI Detecting nucleic acid having two portions, by providing **nanoparticles** having **oligonucleotides** attached to it, contacting nucleic acid and **nanoparticles** to allow **hybridization**, and observing detectable change.
DC B04 D16
IN ELGHANIAN, R; GARIMELLA, V; LETSINGER, R L; LI, Z; MIRKIN, C A; MUCIC, R C; PARK, S; STORHOFF, J J; TATON, T A
PA (NANO-N) NANOSPHERE INC; (ELGH-I) ELGHANIAN R; (GARI-I) GARIMELLA V; (LETS-I) LETSINGER R L; (LIZZ-I) LI Z; (MIRK-I) MIRKIN C A; (MUCI-I) MUCIC R C; (PARK-I) PARK S; (STOR-I) STORHOFF J J; (TATO-I) TATON T A
CYC 98
PI WO 2002046472 A2 20020613 (200265)* EN 442p
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PH PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
AU 2002030593 A 20020618 (200266)
US 2002172953 A1 20021121 (200279)
ADT WO 2002046472 A2 WO 2001-US46418 20011207; AU 2002030593 A AU 2002-30593 20011207; US 2002172953 A1 Provisional US 1996-31809P 19960729, CIP of WO 1997-US12783 19970721, CIP of US 1999-240755 19990129, CIP of US 1999-344667 19990625, Provisional US 2000-176409P 20000113, Provisional US 2000-192699P 20000328, Provisional US 2000-200161P 20000426, CIP of US 2000-603830 20000626, Provisional US 2000-224631P 20000811, Provisional US 2000-254392P 20001208, Provisional US 2000-255235P 20001211, CIP of US 2001-760500 20010112, CIP of US 2001-820279 20010328, US 2001-927777 20010810
FDT AU 2002030593 A Based on WO 200246472; US 2002172953 A1 CIP of US 6361944
PRAI US 2001-927777 20010810; US 2000-254392P 20001208; US 2000-254418P 20001208; US 2000-255235P 20001211; US 2000-255236P 20001211; US 2001-760500 20010112; US 2001-820279 20010328; US 2001-282640P 20010409; US 1996-31809P 19960729; WO 1997-US12783 19970721; US 1999-240755 19990129; US 1999-344667 19990625; US 2000-176409P 20000113; US 2000-192699P 20000328; US 2000-200161P 20000426; US 2000-603830 20000626; US 2000-224631P 20000811
AN 2002-608256 [65] WPIDS
CR 1998-145263 [13]; 2001-061976 [07]; 2001-451868 [48]; 2001-656926 [75]; 2002-258024 [30]; 2003-092900 [08]; 2003-174167 [17]; 2003-182627 [18]; 2003-198491 [19]
AB WO 200246472 A UPAB: 20030320
NOVELTY - Detecting (M1) nucleic acid having two portions, involves providing **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to sequence of two portions of nucleic acid, contacting nucleic acid and

nanoparticles, to allow **hybridization** of **oligonucleotides** with two or more portions of nucleic acid, and observing a detectable change brought about by **hybridization**.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the following:

(1) a **kit** comprising a container holding a composition comprising two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **oligonucleotides** on the first **type** of **nanoparticles** has a sequence complementary to the sequence of a first portion of a nucleic acid, and the **oligonucleotides** on the second **type** of **nanoparticles** has a sequence complementary to the sequence of a second portion of the nucleic acid;

(2) an aggregate **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** of the aggregate **probe** is bound to each other as a result of the **hybridization** of some of the **oligonucleotides** attached to them, and has **oligonucleotides** having attached to it which have a sequence complementary to a portion of the sequence of a nucleic acid;

(3) a core **probe** comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** is bound to each other as a result of **hybridization** of some of the **oligonucleotides** attached to it;

(4) a **substrate** having **nanoparticles** attached to it;

(5) a metallic or semiconductor **nanoparticle** having **oligonucleotides** attached to it, where the **oligonucleotides** are labeled with fluorescent molecules at the ends not attached to the **nanoparticle**;

(6) a satellite **probe** comprising a particle having **oligonucleotides** attached to it, and **probe oligonucleotides** hybridized to the **oligonucleotides** attached to the **nanoparticles**, and having a first portion and a second portion, where the first portion has a sequence complementary to the sequence of the first portion of **oligonucleotides** attached to the particles, and both portions has sequences complementary to portions of the sequence of the nucleic acid, and the **probe oligonucleotide** further has a reporter molecule attached to one end;

(7) a composition comprising at least two **types** of **nanoparticles** having **oligonucleotides** attached to it;

(8) an assembly of containers comprising a first and second containers holding **nanoparticles** having **oligonucleotides** attached to it, which has a sequence complementary to that of the **oligonucleotides** attached to the **nanoparticles** in the containers;

(9) a **nanoparticle** (I) having several different **oligonucleotides** attached to it which comprises recognition **oligonucleotides**, each comprising a spacer portion designed so that it is bound to the **nanoparticle**, and a recognition portion having a sequence complementary to a portion of the sequence of the nucleic acid or another **oligonucleotide**, and optionally a type of diluent **oligonucleotides**;

(10) binding (M2) **oligonucleotides** to charged **nanoparticles** to produce stable **nanoparticle-oligonucleotide** conjugates;

(11) **nanoparticle-oligonucleotide** conjugates (II) which are **nanoparticles** having **oligonucleotides** attached to them which is present on the surface of the

nanoparticles at a surface density sufficient so that the conjugates are stable and having a sequence complementary to a portion of the sequence of a nucleic acid or another **oligonucleotide**, and a covalently bound cyclic disulfide or polythiol functional group;

(12) **oligonucleotides** having a covalently bound cyclic disulfide or polythiol functional group that can bind to the **nanoparticles**;

(13) a **nanoparticle** conjugate for detecting an analyte, comprising **nanoparticles** having **oligonucleotides** bound to it, and **oligonucleotide** having bound to it a specific binding complement of an analyte having a sequence that is complementary to a portion of the **oligonucleotides** bound to the **nanoparticles** and are bound, as a result of **hybridization**, and a linker **oligonucleotide** having two portions;

(14) nonmaterials (III) or **nanostructures** composed of **nanoparticles** having **oligonucleotides** attached to it, where the **nanoparticles** are held together by **oligonucleotide** connectors;

(15) a **kit** for detecting an analyte, comprising a container holding (II), and optional support for observing a detectable change;

(16) a nanomaterial produced, by providing linking **oligonucleotide** comprising two portions, two **types** of **nanoparticles** having **oligonucleotides** attached to it, and a complex comprised of streptavidin or avidin bound to two or more biotin molecules, each having an **oligonucleotide** bound to the biotin molecule, which has a sequence that is complementary to the second portion of the linking **oligonucleotide**, and contacting the first and second **types** of **nanoparticles**, the linking **oligonucleotides** and the complex, to allow **hybridization** of the **oligonucleotides** on the **nanoparticles** to each other and to the linking **oligonucleotide** and the **hybridization** of the **oligonucleotide** of the complexes to the linking **oligonucleotides** so that a desired nanomaterials or **nanostructures** is formed; and

(17) accelerating movement of a **nanoparticle** to an electrode surface.

USE - (M1), (I), (II) and the aggregate **probe** are useful for detecting two or more nucleic acids (from a biological source) having at least two portions, such as viral RNA, bacterial or fungal DNA, a gene associated with a disease, synthetic, or structurally-modified natural or synthetic RNA or DNA, or a product of a polymerase chain reaction amplification. (II) is useful for preparing a nanoprobe conjugate for detecting an analyte, and for detecting a nucleic acid bound to an electrode surface. (I) and (II) are useful for fabrication, and for separating a selected nucleic acid having two portions from other nucleic acids. (I), (II) and the aggregate **probe** are useful for detecting an analyte (especially polyvalent analyte) in a sample (all claimed).

ADVANTAGE - Diagnostic assays employing (II) improve the sensitivity of the assay.

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